
Photo by Randy Montoya

To build a fire

Inside Sandia's Thermal Test Complex

The flame starts out like Bambi, looking slender and vulnerable in the array of video screens above the computer bank in the flame test cell of Sandia's Thermal Test Complex in Tech Area 3. Story, photos on ***page 7****.*

Exceptional service in the national interest

Sandia LabNews

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Chinese nuclear security center opens with help from Sandia

Labs helps support physical protection system to train future nuclear security experts

By Heather Clark

DOE Secretary Ernest Moniz, NNSA Principal Deputy Administrator Madelyn Creedon, Sandia President and Labs Director Jill Hruby, and other experts and international guests joined leaders of China on March 18 to commission the Chinese Center of Excellence (COE) for nuclear security.

The center will provide training for security personnel in China's expanding nuclear power sector.

"I am honored to represent Sandia at this auspicious occasion," Jill said. "We look forward to continuing our collaboration with colleagues at the Center of Excellence to promote nuclear security best practices in China and across the region."


LABS DIRECTOR Jill Hruby and DOE Secretary Ernest Moniz were among a US delegation in China to help commission the Chinese Center of Excellence (COE) for Nuclear Security.

DOE/NNSA and the China Atomic Energy Authority agreed to establish the center in a memorandum of understanding signed in 2010. Led by DOE/NNSA, Sandia along with Los Alamos, Oak Ridge and Pacific Northwest national laboratories and DOD's Defense Threat Reduction Agency contributed equipment and expertise crucial to the design and development of the center.

The Labs team, in an effort led by International Nuclear Security Engineering Org. 6835, consulted with the Chinese State Nuclear Security Technology Center (SNSTC) on the design, operation, and testing of a physical protection system at a mock material processing nuclear facility at the COE for the proper handling and storage of special nuclear material.

Sandia also will support the future success of the center through the design of nuclear security curriculum to train China's security professionals how to protect nuclear facilities and materials. The work is part of Sandia's global security work to enhance security through partnerships that build a capacity worldwide to prevent the misuse of nuclear, chemical, biological, and radiological materials.


WITH DOE SECRETARY Ernest Moniz looking on, Vice Premier Ma Kai of the People's Republic of China greets Jill Hruby at a ceremony to commission the Chinese Center of Excellence for nuclear security.

"It's in our national interest that everybody's nuclear materials are secure," says civil engineer Nick Winowich (6835). "We want to share our expertise in securing nuclear facilities and materials."

Sandia's leadership in physical security grew out of decades of work securing high-consequence facilities against theft and sabotage. Used across the DOE enterprise and by other US and international agencies, performance-based design specifically defines a facility's characteristics, vulnerabilities, and all the potential security risks, including an adversary's capabilities. Its central concept ensures that the time intruders need to steal materials or sabotage a facility exceeds the time responders need to stop them in a fully integrated system. Armed with that analysis, the Labs designs physical protection systems that are customized to meet a specific facility's needs.

According to Sandia employees, the Labs and its counterparts at the China SNSTC developed a cooperative working relationship that will continue to support nuclear security and nonproliferation in the region long after the opening of the center.

Constancy of purpose


Lt. Gen. Frank Klotz, DOE's Under Secretary for Nuclear Security and Administrator of NNSA, brought an upbeat message about the president's FY17 NNSA budget request to Sandia during an all-hands meeting in March. Story on **page 4.**

NW all-hands meeting


Deputy Labs Director and Executive VP Steve Rottler focused on the future during nuclear weapons all-hands meetings that also reviewed Sandia's legacy and current commitments. Story on **page 4.**

Also inside . . .

VPS COMMEMORATE SANDIA/CALIFORNIA'S 60TH ANNIVERSARY

Panel discussion highlights site's achievements, role in the community, and persevering through change. **Story on page 3.**

That's that

All of us have looked on with horror — but sadly, without surprise — at the latest atrocities in Europe, this time in Brussels. These attacks, which come at us with depressing regularity, are too familiar to be shocking, which is itself a shocking development.

Early 20th century American lawyer Clarence Darrow once said, "History repeats itself; that's one of the things that's wrong with history." It does seem to be the case that each generation is faced with challenges that are in some ways eerie echoes of what has come before. Technology may change and global relationships evolve in depth and complexity, but there are some enduring traits in the human heart. Collectively and individually, there lies in us the capacity for both great goodness and great wickedness. I suspect that was as true in ancient Egypt as it is today.

Perhaps wickedness endures along with goodness because it is beyond our ability to eradicate from the genome — or wherever it resides. We may never stamp it out, but at Sandia, the work we do, the mission we are on, can help the forces of order — and yes, I'll say it: the forces of goodness — contain wickedness, beat it back, and hold it down, at least for a time.

* * *

In the face of a barrage of bad news, tragic news, there's a tendency to think that this world is a pretty dark place. And yes, it can be, but it is also a world of wonders. In fact, the title of one of my favorite books is just that: *World of Wonders*, by the Canadian novelist Robertson Davies. It's the life story of a man who grew to be renowned as the world's greatest magician. His traveling show, a high-tech and elaborate production, was called "World of Wonders." By the end of the book, you understand that his tricks, while impressive, are not the real wonders. What the book is *really* about is that we, all of us, live in a world of wonders. And we, in our diversity, our quirks, our individuality, our eccentricities, we are part of the wonder.

* * *

Speaking of wonders, did you happen to see where archeologists think they've discovered hidden rooms in Tutankhamun's tomb? Using high-tech scanning technology, researchers have spotted empty spaces behind apparently solid walls that seem to be consistent with additional rooms.

One of the enduring mysteries of Egyptology is what happened to Queen Nefertiti? Where is her tomb? As a Great Royal Wife and one of the most famous figures from antiquity, an unusually high-profile member of the royal court of her era, archeologists expect there to be an impressive tomb for her. But no trace of one has ever been found. Until now: There is serious thought — based not on idle speculation, but on reasoned guesswork — that those hidden rooms in Tut's tomb are part of a funerary complex in which Nefertiti has lain for more than three millennia. If that proves to be the case, it will be the archeological discovery of the 21st century, just as the discovery of Tut's tomb was arguably the high point of the 20th.

When Howard Carter first thrust a candle into a small opening he had bored into the just-discovered tomb and gazed at what lay inside, illuminated by the flickering light of an oxygen hungry flame, his sponsor and patron Lord Carnarvon, eagerly asked: "Can you see anything?" To which Carter replied: "Yes, wonderful things," which has to rank as one of the great sentences ever uttered in the history of discovery.

Yes, we live in a world of wonders. Our colleagues at Sandia, in their own way, repeat on a daily basis those words of Carter when their work results in a breakthrough, a new insight, even an incremental advance in their field. When they go home, their partner says, "Did you do anything special today?" And they could reply, "Yes, wonderful things."

* * *

A colleague sent along a brief sports page item he thought I'd appreciate. It seems that after underdog Yale beat overwhelming favorite Baylor in a first-round NCAA basketball playoff game, a reporter asked Baylor senior Taurean Prince how Yale beat the taller Baylor team in rebounding by 36-32.

Prince's answer is priceless: "You go up and grab the ball off the rim when it comes off," he said, "and then you grab it with two hands, and you come down with it, and that's considered a rebound. So they got more of those than we did."

Yep, that explains it. Spoken like a guy who should have gone to Yale!

See you next time.

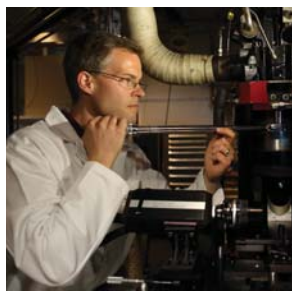
— Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

Mark Musculus named SAE Fellow

By Michael Padilla

Sandia combustion researcher Mark Musculus (8362) has been named a Fellow of SAE International, formerly the Society of Automotive Engineers.

Established in 1975, the Fellow designation honors long-term SAE members who have made a significant impact on society's mobility technology through leadership, research, and innovation. About 20 of SAE's more than 138,000 members are elected Fellows each year.



MARK MUSCULUS

According to the citation from SAE, Mark is being recognized for "his pioneering research on in-cylinder processes of conventional and low-temperature combustion direct-injection engines and the international leadership he has brought to the field. His contributions are providing both a new understanding of the fundamental in-cylinder processes of low-temperature combustion as well as new laser/imaging diagnostic techniques for optical engine research."

Since 2000, Mark has been the principal investigator for the heavy-duty, optical diesel engine project in the Combustion Research Facility (CRF) at Sandia's California site. Mark's research focuses on providing a detailed understanding of new clean-combustion strategies for high fuel-efficiency internal-combustion engines. He uses advanced optical and laser-based diagnostic techniques coupled with high-speed cameras to probe real-time combustion processes in operating engines.

Mark says he is honored by his selection and proud to work with a world-class group of scientists, engineers, and technical staff in the CRF.

"The staff and research capabilities at the Combustion Research Facility are among the most highly regarded in the world," Mark says. "Working with so many giants in engine research at Sandia, many of whom are also SAE Fellows, enabled me to learn and grow in the field. The CRF hosts numerous students, faculty, postdocs, and visitors from around the world year-round, and the opportunities this provides for collaboration and fresh perspectives on our work have been invaluable to me."

Sandia has six other SAE Fellows: John Dec (8300), Dennis Siebers and Pete Witze (retired), all named in 1998; Paul Miles (8362), named in 2005; Chuck Mueller (8362), named in 2011; and Lyle Pickett (8362), named in 2013.

Mark will be honored as a new SAE Fellow April 11 at the SAE World Congress in Detroit.

Retiree deaths

Bruce Dahly (age 66) . . . . . Jan. 1
Emma Vasquez (92) . . . . . Jan. 12
Eloy Barela (84) . . . . . Jan. 16
Marjorie Eyerly (93) . . . . . Jan. 21
Thelma Foster (85) . . . . . Jan. 22
Richard Willey (94) . . . . . Jan. 23
Louis Roybal (86) . . . . . Jan. 23
Edwin Barsis (75) . . . . . Jan. 24
Herbert Harling (90) . . . . . Jan. 26
Rudolph Lewis (71) . . . . . Jan. 26
Hugh MacDougall (86) . . . . . Jan. 30
Daryl William Orth (89) . . . . . Feb. 1
Susan Sujka (71) . . . . . Feb. 1
Terrie Hof (71) . . . . . Feb. 1
Jack Richard Hanna (87) . . . . . Feb. 3
Frederick Gleicher (67) . . . . . Feb. 3
Jay Terrell (77) . . . . . Feb. 4
R. Christopher (85) . . . . . Feb. 7
J. Bryant Hamlet (82) . . . . . Feb. 7
Albert Martin (91) . . . . . Feb. 13
Nick Padilla (87) . . . . . Feb. 15
Ruth Adams (101) . . . . . Feb. 18
Josephine Bazar (96) . . . . . Feb. 18
Louie Eloy Armijo (85) . . . . . Feb. 18
Edward Gonzales (83) . . . . . Feb. 21
Lutz Dahlke (74) . . . . . Feb. 22
Marlin Pound (82) . . . . . Feb. 23
Mark Davis (78) . . . . . Feb. 23
Sally Dyer (90) . . . . . Feb. 26
Lenore Boulton (65) . . . . . Feb. 26
Jack Shoup (92) . . . . . Feb. 28
Robert Butler (90) . . . . . Mar. 2
Charlie Chavez (90) . . . . . Mar. 3
Margerite Miller (90) . . . . . Mar. 4
Michael Robertson (67) . . . . . Mar. 4
Charles Borgman (71) . . . . . Mar. 14

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Jacqueline Chen inducted into Alameda County Women's Hall of Fame

By Michael Padilla

Jacqueline Chen (8351), a distinguished member of the technical staff at the Combustion Research Facility, was inducted into the Alameda County Women's Hall of Fame on March 19 in Oakland, California.

Jackie is being honored in the area of Science and Technology for her contributions to using the world's fastest supercomputers to advance the study of turbulence-chemistry interactions that underpin the operation of gas turbines, automobile engines, and other practical combustion devices.

JACQUELINE CHEN

Jackie says she enjoys leveraging the latest advances in computation to understand the intricacies of turbulence and how it modulates chemical kinetic processes inside an engine. She describes her work as akin to shining a numerical microscope on a small piece of the combustion puzzle inside an engine and understanding how chemical reactions work, and then figuring out how to control it in a way that burns more efficiently and leaves a smaller carbon footprint.

"This honor means a lot to me," Jackie says. "First, because combustion is still the predominant source of transportation energy, and improvements in efficiency and emissions can affect both the nation and the world. This award indicates that my work and the larger Department of Energy programs that fund it are making a difference. Second, I'm proud to be an example of how women can pursue fulfilling STEM careers traditionally dominated by men while also achieving work-life balance."

Impacting the world through science and technology

Jackie says if young women and girls focus on math and science in school, they can positively impact the world they live in through professions in science and technology.

"The most rewarding aspect of my job is mentoring graduate students, postdocs, and early-career engineers and providing them with the tools to launch their own careers in academia, national labs, and industry," she says.

Jackie was drawn to science at a young age. As a middle school student, she conducted a science fair project that involved using an iodine vapor staining method to analyze lipids, a major constituent in the foods that affect energy and cholesterol levels. "Despite ruining my family's linoleum kitchen floor during a flawed experiment — much to my mother's dismay — I went on to receive an award at the science fair," she says.

She became intrigued with turbulent flow after participating in wind tunnel experiments as an undergraduate student at Ohio State University. As a graduate student working with a research group centered at Stanford and NASA/Ames, she began to appreciate the potential of large-scale computing applied to turbulent flows.

The Women's Hall of Fame was established in 1993 by the Alameda County Board of Supervisors, the Alameda County Health Care Foundation, and the Alameda County Commission on the Status of Women. This is the 20th anniversary of Alameda County's Women's Hall of Fame, which now has honored 176 local women. Previous Sandia inductees include Hope Michelsen in 2013 and Katherine Dunphy Guzman in 2014.

Learn a programming language

Jackie 's advice to young people interested in studying science is to take math and science classes to develop a solid foundation, but also to seek out hands-on experience by participating in science fairs, visiting museums, shadowing scientists in their jobs, and working in scientific environments.

"Often the abstract nature of science and math is difficult to grasp without understanding the broader context in which the principles are applied in real life," Jackie says.

She also encourages young people to learn a computer programming language such as Java, Python, C, C++, or Fortran.

"Programming and writing good software is a necessary craft in the modern IT world we live in," she says. "It's also easier to learn, just as with German or French, at a young age. Computation, whether performed on a laptop, a Beowulf cluster, or even the newest supercomputer, is a pervasive tool in science and technology."Jackie 's full bio can be found at http://goo.gl/h5IGOj.

Sandia CaliforniaNews
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Current and former VPs commemorate Sandia's 60th anniversary

By Michael Padilla • Photos by Randy Wong

Achievement, community, and persevering through change were the key topics at a panel discussion last month commemorating Sandia/California's 60th anniversary. Moderated by Bob Carling, director of the Transportation Energy Center at the California site from 2008-14, the panel featured former Sandia/California VPs John Crawford, Tom Hunter, Mim John, Paul Hommert, Rick Stulen, and Steve Rottler, and current Sandia/California VP Marianne Walck. Of that list, Tom and Paul went on to become Sandia Labs directors.

The event, "Honoring 60 Years of Engineering, Science, and Service," focused on key events that occurred during the panelists' tenure as vice president that had a significant influence on leadership and discussion making.

Sandia President and Laboratories Director Jill Hruby, who started her career in California in January 1983 and spent the next 27 years working at the site, participated via a recorded video. She recalled the hard work and significant contributions from everyone at the site in areas from nuclear weapons to homeland security, and the strong foundation in materials research, engineering sciences, combustion, and biology.

"As we look ahead, the women and men at the California site will continue to contribute to the security and well-being of our nation and the world," Jill said. "And as new challenges arise, the nation turns to Sandia to solve difficult problems, and we respond with innovative technical solutions. Today, our work is more diverse and complex than ever, and all of us need to respond with the creativity, integrity, and inclusivity needed."

Div. 8000 VP Marianne Walck said she is always reminded that she has the best executive job in the Laboratories.

"We are in a time right now here at the California Laboratory [with] good challenges," she said. "The open campus coupled with our work in nuclear weapons and sensitive work in cyber and other areas helps implement our mission."

On May 21, the site will host a 60th anniversary event at the Bankhead Theater in Livermore.

FORMER CALIFORNIA VPs Rick Stulen, left, John Crawford, and Mim John share memories.

CURRENT AND FORMER Sandia California VPs from top left to right: Rick Stulen, Steve Rottler, Marianne Walck, and John Crawford. Sitting: Paul Hommert, Mim John, and Tom Hunter.

SANDIA PRESIDENT AND LABORATORIES DIRECTOR Jill Hruby, who started her career in California, said via a prerecorded message that Sandia/California currently plays a major role in every Program Management Unit at the Labs.

Constancy of purpose

FY17 budget request reflects the administration's 'unwavering commitment' to NNSA's mission, Lt. Gen. Klotz says at all-hands meeting

BEFORE AN ALL-HANDS MEETING with Sandia employees, NNSA Administrator Lt. Gen. Frank Klotz was briefed by researcher Todd Griffiths (6121) on Sandia's work related to offshore wind energy technologies. (Photo by Randy Montoya)

By Bill Murphy

Lt. Gen. Frank Klotz, DOE's Under Secretary for Nuclear Security and Administrator of the National Nuclear Security Administration, brought an upbeat message about the president's FY17 NNSA budget request to Sandia during an all-hands meeting in March. The proposed budget represents a nearly 3 percent increase over the FY16 budget.

In remarks delivered at the Steve Schiff Auditorium (and videostreamed to Sandia/California and other Sandia locations), Klotz said, "Your constancy of purpose allowed us to achieve some significant milestones last year, and puts us in a strong position to continue that success in 2016 and beyond."

A vote of confidence

The FY17 budget request, Klotz noted, is the president's proposal to Congress, which has the ultimate approval authority. The proposed budget, he said, is a vote of confidence and indication of the administration's continued "unwavering commitment" to NNSA's enduring missions: to maintain a safe, secure, and effective nuclear weapons stockpile; to prevent, counter, and respond to the threat of nuclear proliferation and nuclear terrorism around the world; and to provide operational support for naval nuclear propulsion plants.

Klotz said that when put in perspective, the proposed budget increase is substantial.

"I ask you to look across the entire range of government agencies in a time of fiscal austerity and find many other agencies that have a flat budget, much less an increasing budget. I think that speaks to the importance of our missions, of what you do for the benefit of our national security."

NNSA's proposed budget supports continued work on three major life extension programs (LEPs) — the W76-1, W80-4, and B61-12 — and one major ALT program, the W88 ALT 370, a scope of weapon-related work not seen since the end of the Cold War.

Proven success

"Last year," Klotz said, "our science-based Stockpile Stewardship Program allowed the secretary of Energy and the secretary of Defense, based on the assessments of the lab directors, including your lab director, to certify to the president for the 20th year in a row that America's nuclear weapon stockpile remains safe, secure, and reliable without the need for underground explosive nuclear testing.

"The proven success of the Stockpile Stewardship Program is made possible each year by the essential investment in the state-of-the-art diagnostic tools, high-performance computing, and modern facilities and capabilities that enable you, the talented scientists, engineers, technicians, and administrators, to carry out the work of NNSA. This year's budget request seeks to build on that success and position us not just for the coming fiscal year but for the Stockpile Stewardship Program of the next two decades."

'Pointy end of the spear'

Klotz noted that the budget incorporates almost $900 million to address aging infrastructure concerns and halt the growth of deferred maintenance of critical facilities and resources, a perennial problem, and one not limited to NNSA.

"In my nearly 40 years of active duty," he said, "I observe over and over and over again that the first dollars always go to the pointy end of the spear and the people who hold the spear. And every year, decision makers will say, 'I'd like to spend some money to buy down deferred maintenance or backlog of maintenance and repair, but I can't afford it this year, so I'll take a risk for one more year.'

"Well, one more year becomes two more years, becomes three more years, becomes 10 more years, and ultimately you get to a tipping point. And then you just have to bite the bullet and spend the money it takes to replace the infrastructure."

Following a slide presentation of the proposed overall budget and its individual components, Klotz said, "You may have noticed that there is a decrease of almost 7 percent (for the Defense Nuclear Nonproliferation program]. There are those who would just look at the bottom line number and say, 'Wait a minute. Does this mean that the NNSA, the DOE, the administration, are backing off on the importance they attach to nuclear nonproliferation and reducing nuclear dangers around the world?' I have to say, no, not in the least."

Committed to nonproliferation efforts

Klotz noted that the reduction reflects the fact that there were significant carryover funds from FY16 in the nonproliferation account, explained mostly by two specific factors.

First, Russia, a partner in nonproliferation efforts since the end of the Cold War, ended its cooperative relationship with the US in the program. As such, some of the FY16 funds that had been allocated for work with Russia were not spent and became available for FY17.

Also, under the terms of a 2000 agreement with Russia, amended in 2010, both parties agreed to dispose of 34 metric tons of excess weapons-grade plutonium. After extensive study, NNSA has decided to adopt a disposal technology that is considerably faster and cheaper than alternatives that had previously been considered. The FY17 budget reflects the decision to adopt the less expensive disposal approach.

"The real story, the rest of the story," Klotz said, "is that we are no less committed to nuclear nonproliferation than we were in the past."

Klotz said that in presentations to congressional committees regarding the budget request he has seen "enthusiastic support for what we're proposing on both sides of the aisle, on both sides of Capitol Hill. I'm very optimistic that the Congress will be supportive of most if not of all of what we have sent up to them."

In closing, Klotz invited the audience to check out his Twitter account at @FrankKlotzNNSA.

Executive VP Steve Rottler emphasizes the future and collaboration in weapons mission all-hands talk

By Sue Major Holmes

Steve Rottler focused on the future during nuclear weapons all-hands meetings that also reviewed Sandia's legacy and current commitments.

During a March 17 all-hands meeting in Albuquerque video-linked to Sandia sites in Carlsbad and Washington, D.C., Steve, Deputy Labs Director and Executive Vice President for National Security Programs, discussed what Sandia needs to perform its core weapons mission. He repeated his message in a separate all-hands meeting in California on March 21.

Steve discussed new strategic objectives for the nuclear weapons mission area, which he said are only one part of an overall, integrated Labs strategy. Rather than set out specific tasks, Steve said, the strategy creates a long-term vision, spotlighting where increased attention and effort will go.

"If we're successful, this strategy will help to further amplify our impact on national security," he said.

Values-based themes for success

Steve emphasized four themes identified in the nuclear weapons mission area strategy as crucial to Sandia's success: integration and partnership, leadership, excellence, and diversity and inclusion.

Integration and partnership are important on the individual and Labs-wide levels: Sandia has its greatest impact and is at its best when it integrates the Labs' capabilities in executing its mission, he said. He also said strategic partnerships with other labs, academia, and the private sector are important.

Leadership is not the same as supervision, Steve said, but rather is something that's expected of every employee. He sees leadership as commitment to national service, commitment to upholding the highest levels of integrity and excellence in everything Sandia does, absolute commitment to delivering the best and most innovative solutions and results, and creating relationships rooted in trust and mutual regard.

Excellence is embodied in the always/never principle of nuclear weapons — that they will work only when required and authorized by the president of the United States and won't ever work under any other circumstance, Steve said. "It's our most important responsibility," he said.

Diversity and inclusion can't be fully realized unless Sandia's work environment welcomes diversity in all its dimensions, Steve said. "Each of us has responsibility to create conditions so that everybody else can bring the full measure of who they are to work every day," he said.

Photo by Randy Montoya

TO VIEW Steve's New Mexico all-hands meeting on Sandia's internal website, go to: http://tiny.sandia.gov/9ay1t. The California all-hands is at: http://tiny.sandia.gov/p1055.

Steve said the purpose of the strategy isn't to list specific tasks, and it doesn't mention current major nuclear weapons programs: the B61-12 Life Extension Program (LEP), W88 ALT 370, Mk21 fuze modernization program, W80-4 LEP, and the new Mobile Guardian Transporter program. Sandia has already made clear commitments to those programs, he said.

Steve also said priorities include increasing and stabilizing support for nuclear weapons materials science research and development, redesigning Sandia's approach for stockpile assessment and evaluation, and replacing the aging Microsystems and Engineering Sciences Applications (MESA) silicon fabrication facility.

Women Catalyzing Innovation in New Mexico

Photos by Randy Montoya

US Rep. Michelle Lujan Grisham, D-N.M., DOE Deputy Secretary Elizabeth Sherwood-Randall, and NNSA Principal Deputy Administrator Madelyn Creedon joined Sandia President and Laboratories Director Jill Hruby and a distinguished panel of women from government, industry, and academia at a roundtable discussion last month to explore the topic: "Women Catalyzing Innovation in New Mexico: Growing our Economic Footprint."

The panel members, with their diverse backgrounds and experiences, offered an optimistic assessment of the role women leaders can play in taking advantage of the state's technological and research infrastructure to enhance the state's economy.

Prior to the roundtable, Lujan Grisham and Sherwood-Randall and their delegations split up to receive tours and briefings on several key Sandia mission areas, including nuclear weapons work, breakthrough defense products, energy, and cybersecurity.

Following the roundtable, the visitors participated in a technology transfer showcase that highlighted recent success stories about technologies from Sandia and Los Alamos labs that are succeeding in the marketplace. California Laboratory Div. 8000 VP Marianne Walck hosted the event and served as moderator.

NNSA PRINCIPAL Deputy Administrator Madelyn Creedon, left, DOE Deputy Secretary Elizabeth Sherwood-Randall, US Rep. Michelle Lujan Grisham, D-N.M., and Sandia President and Laboratories Director Jill Hruby participated in the "Women Catalyzing Innovation in New Mexico" roundtable discussion. (Photo by Randy Montoya)

MODERATOR Jackie Kerby Moore, manager of Technology and Economic Development Dept. 1933, welcomes participants to the "Women Catalyzing Innovation in New Mexico: Growing our Economic Footprint " roundtable discussion in the conference room at Sandia's Center for Global Security & Cooperation.

DURING A TOUR OF LABS FACILITIES and briefings on key mission area work, Center 1700 Director Dave Sandison, right, shows US Rep. Michelle Lujan Grishman a component produced in Sandia's MESA facility as Div. 6000 VP Jim Chavez looks on.

Women's Leadership Panel

Executives on the Sandia Women's Leadership Panel share a light moment with Justine Johannes, director of Center 1500 (at right). On March 21, Sandia Women's Action Network (SWAN) hosted a panel of influential women at the Steve Schiff Auditorium for a discussion about different aspects of leadership. When asked about the greatest lessons she has learned as a leader, Sandia President and Labs Director Jill Hruby said, "It's important to be yourself, care about the people you work with, and be willing to take chances." Jill also emphasized the importance of building trust with colleagues. "Many Sandians have introverted personalities, so building relationships takes time," she said. From left, Becky Krauss, director of Center 3600; Susan Pickering, director of Center 6200; Kim Sawyer, Deputy Laboratories Director and Executive VP for Mission Support; Sandia President and Labs Director Jill Hruby; Div. 3000 VP Melonie Parker; Anna Schauer, director of Center 2900; and Justine Johannes.

Photo by Randy Montoya

Mentoring Café sparks girls' interest in STEM

By Rebecca Brock
Photos by Nicholas Kerekes

More than 60 Albuquerque middle school and high school girls received speed mentoring from influential women leaders in science, technology, engineering, and mathematics (STEM) at Sandia's first STEM Mentoring Café on Saturday, March 12, at the National Museum of Nuclear Science & History. STEM Mentoring Café is a national, interagency effort designed by the departments of Energy and Education, the Association of Science-Technology Centers, and the National Girls Collaborative Project. The goal of the workshop is to spark increased confidence for girls who are interested in STEM careers. The hands-on demonstrations were led by Sandia women scientists and engineers and included a glow table, a fire exhibit, and robotics.

Sandia President and Laboratories Director Jill Hruby spoke to the students about her journey — from being a girl with a passion for math and science to becoming the director of a national nuclear security lab. Jill said, "STEM studies started me on a path that has been fun. I enjoyed it every day, but it wasn't easy. If a career in a STEM field is your dream, stick with it despite any obstacles because you can do it too."

LaDoris (Dot) Harris, director of the Office of Economic Impact and Diversity at DOE, told the girls, "Whatever you decide to do, do it well."

"Whatever you decide to do, do it well."
— LaDoris (Dot) Harris

SANDIA PRESIDENT AND LABS DIRECTOR Jill Hruby, in photo above, engages with a local student during a "What is Fire?" demonstration at Sandia's first STEM Mentoring Café, a DOE outreach program to engage middle school girls. In photo at right, LaDoris "Dot" Harris, director of DOE's Office of Economic Impact and Diversity, participates as Tameka Huff (9545), manager of Next Generation Software Engineering, presents a robotics activity to students.

Sandia brings STEM to life with My Brother's Keeper

By Valerie Larkin
Photos by Randy Montoya

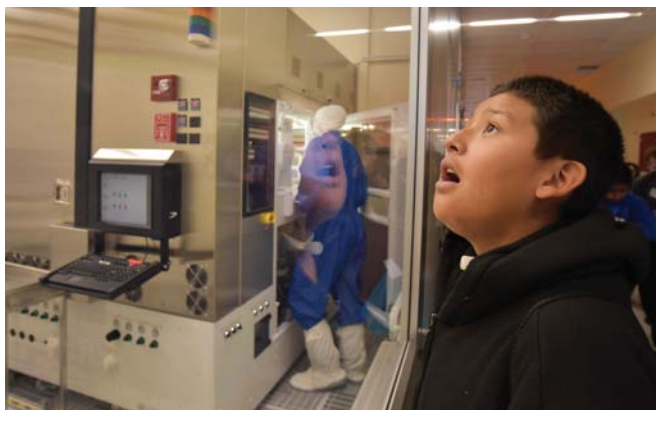
On March 1, more than 60 local middle and high school boys toured Sandia /New Mexico as part of the White House My Brother's Keeper (MBK) initiative.

President Barack Obama launched the initiative in 2014 to provide underrepresented young men with mentors and enriching educational opportunities to inspire them to pursue higher education and careers in STEM fields. Ten DOE labs hosted events in celebration of MBK National Week at the Labs Feb. 29-March 4.

"For MBK, we opened the Labs to give students access and visibility into what we do here. Our goal is to provide them with an engaging hands-on learning experience that sparks their interest in pursuing a career in STEM," says Div. 3000 VP Melonie Parker.

Students from Native American Community Academy, Technology Leadership High School, and Hayes Middle School spent the day interacting with Sandia researchers who discussed their work and the paths that led them to the Labs.

On March 2, researchers and executives from Sandia/California were welcomed to Lawrence Livermore National Laboratory to participate in its MBK event. Electrical engineer and technical project manager Muferihat Abduljelil (8534) benefited from similar programs in her youth, and she volunteered at MBK because she wanted to give back. "I see how this type of program can positively influence kids by taking away the 'intimidating' parts of science and math, and helping them explore the fun side of it," she says.



Sandia flame cell tests, tames Godzilla-style fire

By Neal Singer

The flame starts out like Bambi, looking slender and vulnerable in the array of video screens above the computer bank in the FLAME facility of Sandia's Thermal Test Complex in Tech Area 3.

Within seconds, cameras record what appears to be a forest fire of rushing flames in a 16-foot-high test enclosure. Then flames burst out the cell's top like a creature in a monster movie, towering almost to the roof of the 50-foot-tall building that houses the cell. One video screen looks like a black-and-white movie of a large building in flames. A full-color screen shows rich, yellow-red packets of flame whirling upward like escaping souls, while outside video cams show black smoke emerging from large stacks.

Then a safety switch, sensing a possible electrical overload, turns off a 750-horsepower fan engaged in sucking in outside air to equalize the pressure of air leaving up the stack. Operators monitoring the feedback information immediately cut the supply of fuel. The inferno becomes a river of fire, then a stream of fire, then a rivulet, and then it's gone.

FIRE WATCH — Shane Adee, Tom Blanchat, and Anay Luketa (all 1532) review test procedures in the Thermal Test Complex control room. (Photo by Randy Montoya)

Validating fire-physics models

But the data collected about its fierce brief life remains.

Data from this and other experiments at the $40 million complex can be used to validate fire-physics models and qualify nuclear weapons hardware subjected to extreme conditions, says test director Anay Luketa (1532), who also performs analysis and simulations at the complex.

"The objective of these FY16 experiments is to create an extreme abnormal thermal environment representative of what a weapon potentially could be exposed to," she says. "The current test series controls boundary conditions and offers repeatable experiments, something difficult to achieve in outdoor flame tests where even a light wind can significantly tilt a fire plume."

The FLAME team measures temperatures, heat flux, flame velocity, and height and burn rate of these whirling fire plumes. The whirl is created in an open-top, square enclosure surrounding a pool of fuel. The enclosing walls do not meet at the corners; rather there are gaps positioned to cause a rotational pattern of inflowing, entrained air induced by the fire. This causes the flame to spin and rise in a vortex from a pond of burning jet fuel contained in a 3-meter-diameter pan.

Members of the fire team wear burn suits where appropriate and follow 20 pages of instructions to ensure safe handling of materials and proper procedures during ignition and close-down. They methodically turn on pumps, enable valves, bleed fuel to purge unwanted air from the system, thereby minimizing false readings, and lock a succession of safety doors before powering up the ignitor.

Basement cameras check for dripping fuel. A simple hammer tap creates a sound-signal that allows researchers to synchronize data collected from video cameras placed throughout the structure. A National Environmental Policy Act (NEPA) process adds ammonia within the external smoke stack to precipitate soot onto a large plate; simple banging with large pneumatic actuators drops the soot into a collection container. In an additional safety measure, the roof of the building can lift if necessary to reduce excess pressures by allowing fire-heated gasses to escape.

The interest in tracking fire whirls rather than ordinary burns is because whirls potentially generate much higher heat fluxes than non-rotational pool fires. "Whirls witnessed in forest fires and in urban areas have demonstrated disastrous impacts due to the generation of extremely high velocities coupled with high heat release rates," says Anay.

FIRE WHIRLS from a 3-meter diameter JP-8 test conducted in the FLAME facility. (Photo by Richard Simpson)

TEST-READY — Vince Valdez and Randy Foster (both 1533) about to enter FLAME for test preparation. (Photo by Randy Montoya)

Tom Blanchat prepares for a fuel pan and calorimeter test in the Cross Flow Fire Test Facility, or XTF. (Photo by Randy Montoya)

City resilience: Sandia analyzes effects of rising sea levels in Norfolk

Analysis method available to cities that want to become more resilient

By Heather Clark

In Norfolk, Virginia, an East Coast city that's home to important seaports, catastrophic flooding could damage more than homes and roads. A new study from Sandia assesses how much the city, its region, and the nation would suffer in damages to lost economic activity if it does nothing to address rising sea levels.

In partnership with the City of Norfolk's Resilience Office and 100 Resilient Cities (100RC), pioneered by The Rockefeller Foundation, Sandia analyzed the risk to important assets, quantified their value and helped Norfolk prioritize the most effective ways to stay resilient in a natural or manmade disaster.

Sandia created an Urban Resilience Analysis Process to help reframe the conversation in Norfolk regarding flooding and demonstrate how the long-term benefits of mitigation outweigh the short-term costs associated with it, systems scientist Robert Jeffers (6921) says. The city and region are now taking new approaches to handle the resilience challenges posed by rising tides and water management.

A holistic framework

The process, now available to other cities, is a holistic framework. It includes key elements of Sandia's critical infrastructure modeling and simulation tools, risk consequence assessment, and systems analysis expertise to show cities the most effective investments they can make to become more resilient, Robert says. The report also shows individual cities how their resiliency affects other cities in their region, the nation, and the world, he adds.

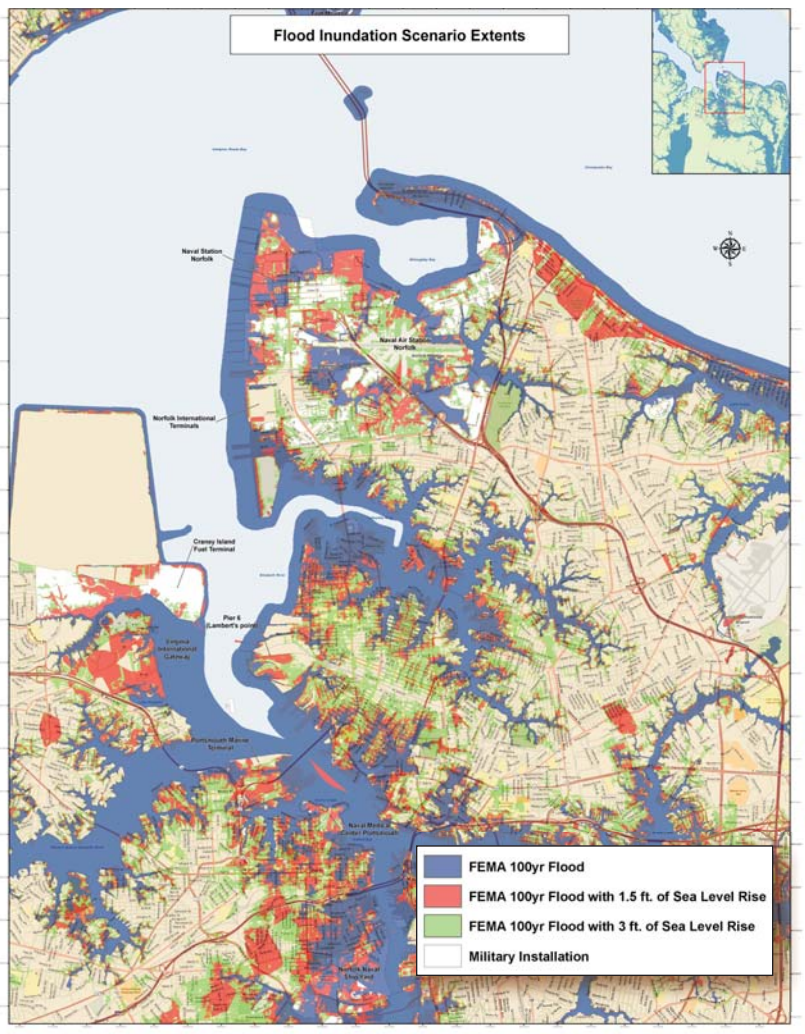
To prove the analysis process works, Sandia analyzed Norfolk's vulnerabilities in the face of a nor'easter, a storm that blows in from the northeast and brings severe coastal flooding, erosion, and hurricane-force wind, along with economic damage. The work was done in partnership with 100RC, which currently works with a global network of 67 cities to better prepare communities like Norfolk to withstand natural or manmade disasters, recover more quickly, and emerge stronger.

"Sandia Labs provided Norfolk with an invaluable level of expertise and technical support through this partnership. The systems analysis they produced gave the city new data and insights into the value and interdependencies of its economy, as well as the relative strengths and vulnerabilities of its infrastructure," says Amy Armstrong, director of city relationships for 100RC. "This data and analysis will be crucial in Norfolk's future planning efforts, and it is my hope other cities in the 100RC network are also able to take advantage of this sophisticated analysis to help make them more resilient to the inevitable shocks and stresses they will face."

Since 2001, Sandia has conducted consequence analyses at a national scale at the Department of Homeland Security's National Infrastructure Simulation and Analysis Center (NISAC), jointly housed at Sandia and Los Alamos national laboratories. DHS created NISAC to assess the impacts of a variety of threats to the nation's critical infrastructures. The research foundation built by NISAC made it possible for Sandia to build its detailed analysis of Norfolk's infrastructure, Robert says.

Report identifies risks to infrastructure

"Recently, a lot of people have come to the realization that cities are where the rubber meets the road," says manager Eric Vugrin (6921), who leads Sandia's 100RC work. "It's the cities that have the governance and operational responsibility to get things done."



In the first step of the Urban Resilience Analysis Process, Sandia experts work with city personnel, utility and industrial representatives, and emergency planners to identify potential disasters and infrastructure critical to the city. That initial step will inform later decisions about investment priorities, Eric says.

Then decision-makers identify acute and chronic problems for the city and develop resilience metrics to measure the effectiveness of different solutions. In Norfolk's case, Sandia estimated direct economic losses to local businesses and indirect losses to local, national, and international businesses.

While such analyses would take into account multiple scenarios and infrastructures, Sandia's report was limited in scope to show what such a process can do for cities. Sandia looked at four critical infrastructures — electrical power, telecommunications, transportation, and its fuels — and the economic damage that would result from disrupted services in Norfolk and the region.

Analysis can detail city's national, global importance

Sandia researched the effects of a 100-year flood in three scenarios of net rising sea levels of 0, 1.5 and 3 feet and created maps at a resolution of 10.9 yards (10 meters) to show how far inland floodwater would reach. Experts then overlaid electrical substations, roadways, telecommunications centers, and fuel infrastructure to show the flood's impact, Robert says.

The analysis focused on the Norfolk International Terminal, one of the nation's busiest ports; and Lambert's Point Pier 6 Coal Terminal, the largest and fastest coal transport facility in the northern hemisphere. Pier 6 and two other coal terminals in the region account for about 40 percent of all coal exports from the US and about 70 percent of coal shipping capacity on the eastern seaboard, Robert says.

Norfolk is "critical to coal transportation nationally and globally, particularly for coal blended for metallurgical uses, such as steel production," Robert says.

By providing cities like Norfolk with data to quantify their national and global importance, Sandia helps them build their cases for obtaining funding to pay for infrastructure investments, Eric says.

Quantifying impacts helps cities prioritize

The Regional Economic Accounting Tool developed by Sandia found that regional direct and indirect economic impacts in the four days following the flood ranged from $354 million to $606 million, depending on which of the three scenarios the model used, according to the report. Indirect economic impacts might include disruptions to the regional supply chain or losses to businesses dependent on infrastructure and related businesses that suffered flood damage.

"The city itself might not be able to afford all the flood mitigation they require, but if you look at the national security and national economic implications, the performance of the city of Norfolk is important and there may be national incentives to help them build resilience into their city," Eric says.

Norfolk Chief Resilience Officer Christine Morris adds: "The opportunity to work with the experts at Sandia on the development of an Urban Resilience Analysis framework provided the city of Norfolk with an incredible opportunity to better understand how to prioritize investments. Giving cities access to world class analytical talent like Sandia is exactly what is needed to build resilient cities."

While Norfolk's report was limited in scope to show how the concept worked, such analyses can be applied to any disaster, for example, earthquakes, hurricanes, tornadoes, cyberattacks, power outages, or terrorist attacks. And, cities can choose to analyze any number of critical infrastructures or solutions, the researchers say.

Eventually, Norfolk can determine the most cost-effective investments by plugging in a variety of solutions or combinations of solutions into the model, which will simulate the economic outcome of each choice, Robert says.

With more research and development, Sandia aims to improve the analysis tool and make it more user-friendly for cities, Eric says.

"City planners don't have time to learn the sophisticated mathematical models in the tool," he explains, "so Sandia is asking how we get to the point where we can simplify this framework and hand it over to the cities for their use."

Good company

Small businesses picked to get Sandia clean-tech help

By Nancy Salem

DOE chose seven small clean-energy businesses to work with Sandia to bring next-generation technologies to market faster.

"We're excited to help these companies commercialize their products and advance the clean-energy economy," says Jackie Kerby Moore, manager of Technology and Economic Development Dept. 1933. "This is tech transfer at its best, bringing national laboratory expertise to the private sector and helping the environment."

The Small Business Vouchers Pilot was launched Sept. 23 with a website where companies could apply to receive technical help from DOE labs. In an announcement earlier this month, the DOE Office of Energy Efficiency and Renewable Energy (EERE) said 33 of the hundreds of applicants received funding for the first of three rounds of the pilot. Nine DOE labs will participate, with a combined first-round budget of $6.7 million.

Sandia's seven vouchers total $1.62 million. The selected companies are iBeam Materials Inc. of Santa Fe; Altergy Systems of Folsom, California; FastCAP Systems Corp. of Boston; Renewable Power Conversion Inc. of San Luis Obispo, California; Skysun LLC of Bay Village, Ohio; Columbia Power Technologies Inc. of Corvallis, Oregon; and Micron Optics Inc. of Atlanta. The vouchers range in value from $150,000 to $300,000.

The pilot, part of EERE's National Laboratory Impact Initiative, aims to help small businesses by giving them access to world-class expertise and tools at the labs. The pilot will fund projects in the areas of solar, geothermal, wind, water, fuel cells, advanced manufacturing, bioenergy, buildings, and vehicles. The types of projects include prototyping, materials characterization, high-performance computing, modeling and simulation, scaling to generate customer samples, performance validation, and regulatory compliance.

Wide variety of clean-energy efforts

Last year, DOE chose Sandia as one of five leads in the $20 million pilot, along with the National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, and Pacific Northwest National Laboratory. Sandia was named the lead lab in the sectors of solar energy, wind energy, and geothermal technologies.

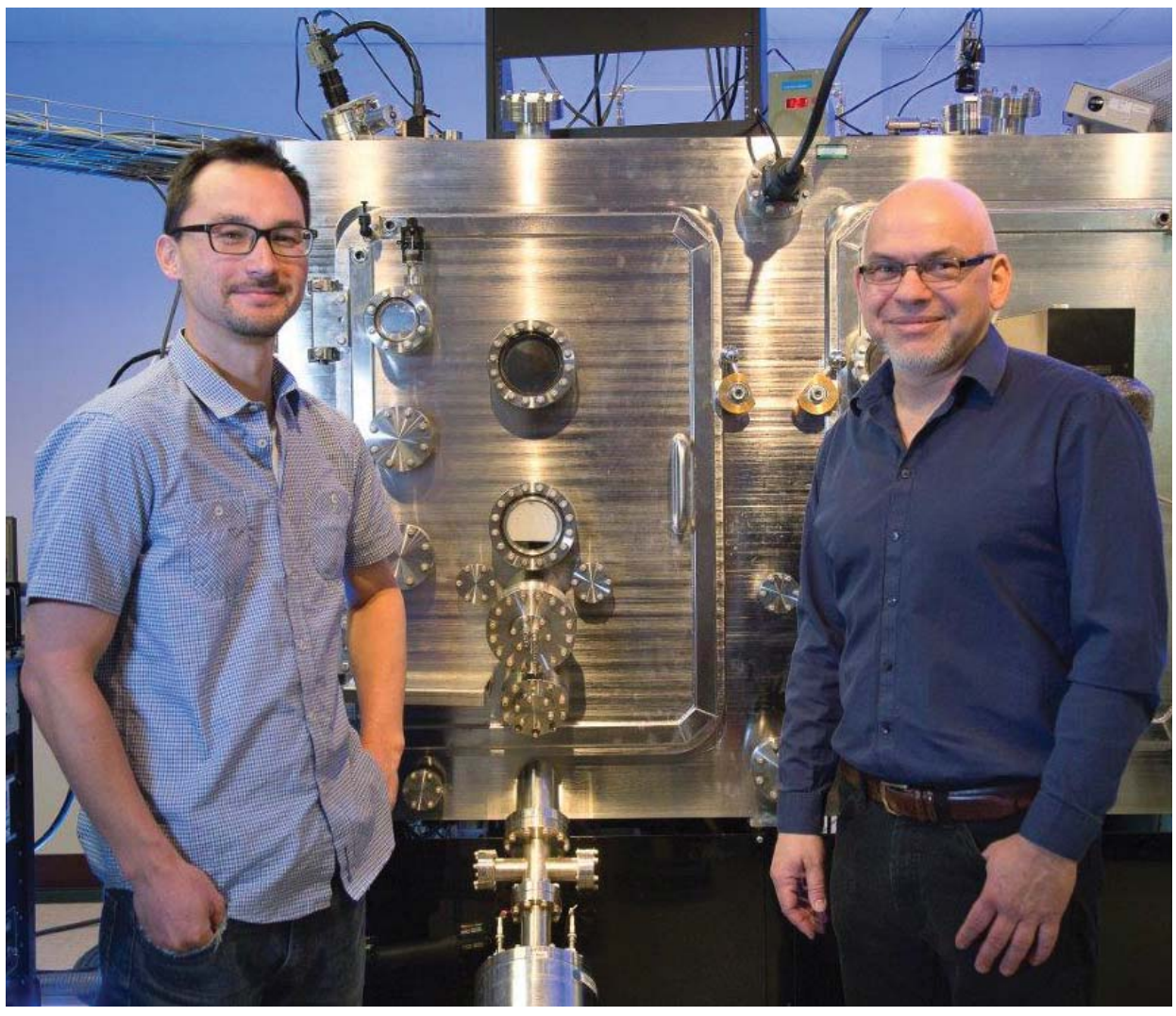
Companies selected to collaborate with Sandia are working on a wide variety of clean-energy efforts:

• iBeam is developing new LED products for the lighting, display, and wearable electronics industries.

• FastCAP's technology powers downhole tools operating at extremely high temperatures, from 150 to 300 degrees Celsius.

• Renewable Power Conversion seeks to advance its macro-micro inverter technology for commercial and utility-scale photovoltaic power systems.

• Skysun will do systems modeling to better understand the performance of its prototype for an array of heliostats controlled by a single mechanism.



Chris Wung, left, is senior scientist, and Vladimir Matias is CEO of iBeam Materials Inc. The Santa Fe company was one of seven small businesses chosen to work with Sandia to advance their technologies. iBeam is developing new LED products for the lighting, display, and wearable electronics industries. (Photo by Sandra Valdez)

• Micron Optics is working on integration of fiber optic systems in commercial wind turbines.

• Columbia Power Technologies is developing a proprietary system that converts ocean waves into cost-competitive, utility-scale electricity.

• Altergy Systems will further develop its fuel cell technology for backup power in remote, mission-critical areas.

"The Small Business Vouchers Pilot will let us collaborate with Sandia's world-renowned solar researchers," says Skysun President Jim Clair. "That would normally be beyond the reach of a start-up like Skysun. This teamwork will dramatically accelerate our technology's acceptance and deployment into the marketplace."

Companies can continue to apply for vouchers

Two more rounds of competition will be offered to small businesses in 2016. To be eligible, businesses must be US-based and -owned with no more than 500 full-time employees worldwide.

Companies can apply to Sandia through the SBV website at https://www.sbv.org/ for $50,000 to $300,000 in vouchers that can be used for a variety of technical services. Successful companies will be required to provide a 20 percent cost share or in-kind services.

Fabrizio Martini, technical lead at FastCAP Systems, says the partnership with Sandia will help validate the company's technology. "Geothermal energy has tremendous potential in the United States, and with further development could power more than 100 million American homes," he says. "We are glad to partner with Sandia, one of the most advanced research centers in this field."

Melonie Parker named HR Professional of the Year

SHRM New Mexico

By Valerie Larkin

Human Resources and Communications Div. 3000 VP Melonie Parker was named Human Resources Professional of the Year by the Society of Human Resource Management's New Mexico (SHRM NM) chapter at a ceremony on March 9.

SHRM NM's HR Professional of the Year award honors an HR professional who has elevated the profession, served as a role model for his or her peers, and set the standard for other HR professionals to follow. Nominees are evaluated on their leadership, innovation, integrity, strategic thinking, character, objectivity, passion, influence, and HR knowledge.

MELONIE PARKER

"Melonie is an enthusiastic results-oriented, proactive HR leader with high integrity and demonstrated accomplishments. Her passion for serving the Albuquerque community and championing Sandia's diversity and outreach programs is outstanding. This award is the perfect venue to recognize her achievements," says Kim Sawyer, Deputy Labs Director and Executive VP for Mission Support.

The announcement was made at SHRM NM's three-day state conference, held at the Embassy Suites Hotel in Albuquerque.

"I am tremendously honored by this award," Melonie says. "I have so much passion for HR, and I'm driven every day to find innovative ways to support Sandia's mission, our employees, and our customers. To be given this award by my peers is a validation of the energy and focus I've put into the HR profession."

CPR knowledge is at your fingertips

By Lindsey Kibler

Imagine a colleague suddenly grabbing his chest and slumping to the ground. Would you know what to do?

Sandia has 226 automated external defibrillators around the Labs but members of the workforce first need to learn how they can help that colleague in the office, says HBE health educator Jennifer Perea (3334).

"We have a community at Sandia who want to help one another in these situations but don't know how," she says.

Jennifer has dedicated much of her time and energy to ensuring members of the workforce are trained in cardio-pulmonary resuscitation (CPR). In 2014, she began teaching the American Heart Association's Friends and Family CPR course, which offers free CPR and automated external defibrillator (AED) classes to the workforce as an alternative to the Heartsaver CPR (MED104) training that costs more than $150.

"The Friends and Family CPR training is intended for members of the workforce who are not required to perform CPR in their job duties. It's a practical and free option for learning CPR with the most hands-on practice time possible," says Jennifer.

Increasing a person's chance of survival

Participants learn the life-saving skills of adult Hands-Only CPR, child CPR with breaths, infant CPR, and choking relief for all ages. Participants are also trained in the proper AED application and use for adults and children.

"It's important for everyone to know how to administer CPR because it's a life-saving tool. CPR alone increases a person's chance of survival. By providing continuous chest compressions, a person is essentially buying the patient time by pushing oxygen-rich blood to the vital organs," Jennifer says.

Effective bystander CPR provided immediately after sudden cardiac arrest can double or triple a victim's chance of survival, but only 46 percent of cardiac arrest victims receive CPR from bystanders, according to the American Heart Association. Its statistics show that of the more than 350,000 out-of-hospital sudden cardiac arrests that occur annually, 70 percent occur at home and less than 8 percent of people who suffer cardiac arrest outside of a hospital survive.

Because a large majority of heart attacks occur outside of a hospital, most people who will need to perform CPR will do so on a child, spouse, parent, or friend.

Working as a team

"My goal with the training is to empower every person, no matter what role they're playing," says Jennifer. "I teach them to work as a team. One person should call 911, one should grab an AED, one should be doing chest compressions, and one should be taking notes to give to responders."

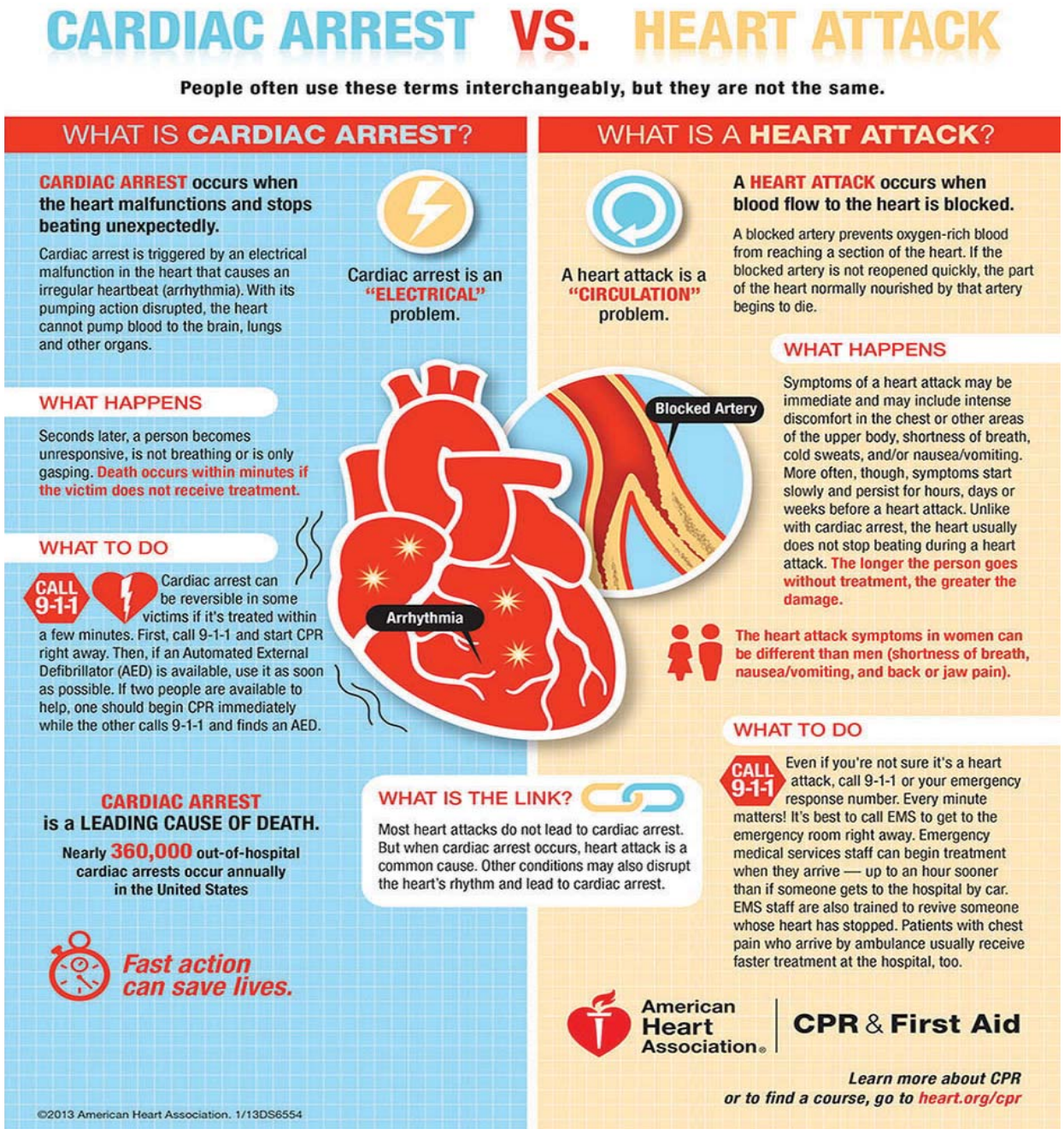
In an ideal situation, at least four people in the area would assist with each role, but since every situation is different, Jennifer anticipates those scenarios and incorporates them into the training. She includes a block of instruction on how to call 911 dispatchers.

"Dispatchers are considered responders. They provide life-saving instructions written by a doctor. Although they aren't physically there in an emergency situation, calling 911 is as good as having a responder there for guidance," says Ricardo Paz (42364), emergency management trainer.

Dispatchers are able to instruct callers on how to correctly administer CPR and, if needed, how to safely use an AED. Using an AED can cause injury without proper guidance, Ricardo says. Sandia's dispatchers are available 24 hours a day, 7 days a week, to aid good Samaritans in emergency situations.

It is important to remember that any member of the workforce who correctly renders aid, such as CPR or an AED, as a life-saving measure is covered under the Good Samaritan law and the New Mexico Cardiac Response Act, Jennifer and Ricardo say. A good Samaritan, in legal terms, refers to someone who renders aid in an emergency to an injured person on a voluntary basis. Sandia also has measures in place to protect good Samaritans.

"Sandia does an excellent job of teaching scene clearing, note taking, calling 911, and CPR and AED training. My goal is to get people into the Friends and Family CPR class. I know HBE can't reach everyone, but by teaching adult, child, and infant responses, we can perhaps touch the lives of the families of our workforce," Jennifer says.



Enroll in the Friends and Family CPR class using the HBE Events Calendar at: https://tiny.sandia.gov/8vfis. Classes are typically offered twice a month and those completing the class earn 1,000 Virgin Pulse points. Groups of 10 or more can request a CPR Awareness Class, which provides a general overview of CPR and AED use.

AED locations around Sandia can be found on the HBE homepage under the Onsite Health & Wellness tab. To request installation of an AED in your work area, visit https://hbeupdate.custhelp.com to submit an AED Questionnaire Form.

MED104 will continue to be offered and mandatory for members of the workforce who are required to perform CPR as part of their job duties.

Additional questions should be directed to HBE Customer Service at 505-844-HBES (4237).

More information on CPR, first aid, and emergency cardiovascular care is available on the American Heart Association website http://cpr.heart.org.

Sandia nanomaterials researcher Hongyou Fan elected MRS Fellow

HONGYOU FAN

By Neal Singer

Hongyou Fan (1815) has been appointed a Fellow of the Materials Research Society (MRS).

The highly selective distinction represents less than 0.2 percent of MRS membership. Hongyou is the first Sandian selected since 2011, and the fifth since the honor was first offered in 2008.

His work was cited for "pioneering contributions to the development of novel synthesis methods and self-assembly processes to fabricate multifunctional nanomaterials for nanoelectronic and nanophotonic applications and service to the materials community."

The MRS describes its Fellows as "outstanding members whose sustained and distinguished contributions to the advancement of materials research are internationally recognized."

The award follows upon Hongyou's selection in 2015 to deliver the MRS Fred Kavli Distinguished Lectureship Award in Nanoscience. Hongyou was the first national laboratory scientist to be so honored.

Hongyou's poster on the self-assembly of nanoparticles into ordered, three-dimensional films also won an outstanding poster award from the society at the Spring 2013 MRS meeting.

The formal announcement of Hongyou's new status will be made at the 2016 MRS Spring Meeting in Phoenix, meeting from March 28 - April 1.

The only other MRS Fellow currently employed at Sandia is Sandia Fellow Jeff Brinker (1000).

SANDIA CLASSIFIED ADS

MISCELLANEOUS

SKI, w/bindings, Dynastar Outland, 160s, red, white & black, good condition, $100; Motorola modem, 2, $40/both or $25 ea. Poe, 505-379-6350.

'GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE', 5th edition, Project Management Institute, new, $30. Stogsdill, 280-0595.

LIGHT BULBS, CFL, used, 8, Ultilitech 15W (65W), BR30 medium base, bright white (3500K), $2 ea. Weagley, 385-4059.

TREADMILL, Life Fitness, folding, rarely used, cost $2,500, asking $1,000. Grimes, 313-3058.

PANCHO VILLA LITHOGRAPH, featuring Wallace Berry, framed, 28" x 24", photo available, $200. Kovarik, 918-3577.

LOVESEAT/FOLD-A-WAY BED, Crate & Barrel, pale ocean green, barely used, can text photo, $250. Nagel, 821-1881.

REDINGTON RED FLY ROD, 7'6", 2-pc., plus Okuma SLV45 reel, St. Croix hard case, good condition, $120. Menicucci, 505-235-8501.

WINDSHIELD, VStream Quantum, hard-coated, for all GL1800 Gold Wing models, w/vent, no marks, $250. Cocain, 281-2282.

LOFT BED, steel-framed, full size, w/built-in desk, $100. Porter, 821-7813.

MOVING SALE, armoire set, $495; dining room table, w/chairs, $475; all Southwest style, beautiful, photos available. Mares, 505-980-5438.

WEDDING DRESS, Alfred Angelo, worn once, size 2-6 (bustle), white, paid >$2,000, asking $500. Martinez, 417-3242.

3D TV, Sony Bravia, XBR-46HX909, new, never used, $750 OBO; TiVo Premiere, 320 GB, brand new, never used, $50 OBO. Lujan, 299-2218.

FOLDING LADDER, aluminum, 7-ft., $90; lounge folding chairs, RV water pump, electric heaters, 2 ea., $25; RV vacuum, $50; LP gas kit, $45; more. Garcia, 554-2690.

ROADMASTER TOWING ITEMS, Even-Brake, $500; Sterling tow bar, $300; front-arm brackets, $100; tow defender, $100. Gehrke, 263-7327.

"DISNEY'S NEWSIES' TICKETS, 2, June 25, 8 p.m., Popejoy, seats AA105/106, $67.65 ea. Verley, 221-7827.

YOUNG AT HEART CONCERT, w/Bar-D Wranglers, April 8, 2 p.m., 7 p.m., Sandia Baptist Church, $15; $10 meals 11:30 a.m. & 5 p.m. Martin, 858-3009.

DISHWASHER, Frigidaire Ultra Quiet, stand-alone, rolls to sink, w/hook up, $100. Wimpy, 822-0223.

JUNIOR CLOTHING, sizes small/medium, dresses, summer tops, bras, purses, etc. shoes sizes 6 & 6.5. Velasquez, 610-3672.

DINING ROOM SET, 59" x 34" w/2 chairs, $300; mixed leather & fabric loveseat, $200 OBO; both American Home, bought summer '05. Patel, 505-310-4156.

REFRIGERATOR, GE Profile, $175; GE space maker microwave, $50; Whirlpool electric oven, $175; all excellent condition. Senseney, 505-620-6737.

COMPOUND BOWS, 2, RH, $180-$350; Ford longbed camper shell, red, $400. Schroeder, 917-4516.

HARLEY-DAVIDSON SHIRTS, 40, new, from all over US, never worn, size XXL, $10 ea. Kilbane, 715-7681.

INDOOR/OUTDOOR FURNITURE, china, VCR/DVD tapes, books, collectible dolls, vehicles, much more, photos available. Crosby, 260-1070.

GENERATOR, Robin (Fuji Industries), 600W, AC/DC, portable, 40-lbs., <200 hours, $275. Murphy, 797-8779.

TIRES, 4, Hankook Dynapro ATM, P265/75R16 114T, excellent condition, $500 OBO. Montoya, 505-553-4373, ask for Charles.

SECTIONAL COUCH, w/chaise, huge, golden brown, comfortable, beautiful, excellent condition, Paradise Hills, $800. Katzenmeyer, 925-819-2795.

GEORGE STRAIT TICKETS, 4, April 23, Las Vegas NV, single seats, same section, close together, $300. Martinez, 505-688-7117.

MASSAGE CHAIR, black, leather, model HT-275, w/manual, digital remote, dual lumbar heat, alleviate stress/tension, $975 OBO. Myers, 505-903-0911.

DINING ROOM CHAIRS, 6, dark brown leather, 19-in. to seat, 39-in. tall back, $150. Shiver, 505-377-4154.

WWII B-3 SHEEPSKIN BOMBER JACKET, authentic, new condition, size 40, made in USA, $700. Hill, 205-1496.

ARMOIRE & HUTCH, dark cherry finish, $700 OBO. Hennessey, 505-269-6243.

WEDDING DRESS, 2015 Alfred Angelo, style 2527, size 0-4, perfect, professionally dry-cleaned, w/hairpiece, veils, wrap, stole, retails $2,675, asking $900. de la Fe, 903-0717.

TRANSPORTATION

'06 ACURA TSX, 6-spd. manual, leather, sunroof, navigation, alloys, light blue, gray leather, 141K miles, nice condition, $6,000 OBO. Dwyer, 271-1328.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday.
Submit by one of these methods:

- **EMAIL: Michelle Fleming (classads@sandia.gov)**
- **FAX: 844-0645**
- **MAIL: MS 1468 (Dept. 3651)**
- **INTERNAL WEB: On internal web homepage, click on News Center, then on *Lab News* link, and then on the very top of *Lab News* homepage "Submit a Classified Ad."**

If you have questions, call Michelle at 844-4902.
Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

'07 CHEVY TAHOE Z71, 4WD, fully loaded, DVD, navigation, black, 1 owner, 130K miles, good condition, $16,000. Hutchins, 806-674-8779.

'07 HONDA CIVIC Si, 2-dr., 6-spd., black, 68K miles, runs great, rough paint, very clean, $8,500. Riordan, 505-459-7859.

'07 TOYOTA TACOMA SR5, 2WD, 4-dr., V6, AT, PS, PB, AC, CD, red, 102K miles, $17,500. Huebert, 505-235-7702.

'11 SHELBY GT500 MUSTANG, supercharged, 6-spd., SVT performance pkg., gray, Ford premium care warranty, $37,999 OBO. Johnson, 505-720-0994.

'93 JAGUAR VADEN PLAS, new battery, fuel pump & paint job, $3,000 OBO. Garcia, 280-5815, ask for Frank.

'98 BUICK CENTURY, V6, AT, PS, PW, spotless interior, locally owned, 68K miles, $2,500 OBO. Swanson, 505-506-0114.

'15 SUBARU WRX LIMITED, 6-spd. manual, loaded, white, custom tires/wheels, 15K highway miles, excellent condition, $28,000. Horton, 280-4202.

'07 JEEP LIBERTY, limited model, 4x4, white, 125K miles, receiver, good condition, asking KBB $6,170. Delgado, 505-917-7090.

'06 TACOMA, longbed, 4x2, AT, new tires, modified air & exhaust, 1 owner, clean title, 112K miles, $14,500 OBO. MacBain, 505-604-3052.

RECREATION

'08 HARLEY-DAVIDSON SOFTAIL DELUXE, 2,276 miles, runs excellent, clean title in hand, $11,000 OBO. Marquez, 505-250-2988.

BICYCLE, like new, 26-in. Townie, 21-spd., email for photos, $295 OBO. Mooney, 553-0256, smooney0081@gmail.com.

'14 MOUNTAIN BIKE, specialized Crave Comp, 29-in., green, large 19-in. frame, $800. Elisberg, 505-550-1632.

'02 HONDA SHADOW SPIRIT, 750cc cruiser, <9K miles, good condition, needs battery, $2,500. Miles, 505-615-7682.

BOAT, Seaswirl, 17-ft., open bow, 88-hp outboard, marine radio, many other extras, $6,500 OBO. Barnard, 771-4620.

'01 EXCEL LE 5TH WHEEL, 35-ft., 2-drs., 3 slide outs, rear kitchen, shower/bathtub, TV/computer center, well-maintained, lots of storage, $19,900. Schuster, 299-1072.

'12 HONDA CRF-450R DIRT BIKE, new tires, skid plate crash bars, low hours, $3,600 OBO. Reeder, 553-4786.

'96 HARLEY-DAVIDSON FLHR ROAD KING, 32K miles, very good condition, $8,500. Gilbert, 892-1963.

'09 YAMAHA V-STAR 250, like new, only 1,600 miles, always garaged, excellent daily rider, 60-mpg, $2,500. Langwell, 382-3591.

REAL ESTATE

3-BDR. HOME, 2 baths, 2 balconies, totally remodeled top/bottom, great mountain view, near Tanoan, $289,000. Hanks, 505-977-3372.

3-BDR HOME, 2 baths, 1,550-sq. ft., gated community, refrigerated air, Ventura/Paseo del Norte, $319,000. DuBay, 268-0307.

3-BDR. HOME, 2 baths, single level, 2,100-sq. ft., Willow Wood, outside Eubank gate. Felix, 573-0595, ask for Sam.

1.6 ACRES, view lot, Petroglyph Trails, Placitas, for sale by owner, $115,000. Leonard, 502-905-1677.

3-BDR. HOME, 2 baths, 1,780-sq. ft., well kept, move in ready, McCollum Elementary 1 block, Constitution/Eubank area. Marchi, 307-8993.

1-BDR. HOME, 2 baths, 1,300-sq. ft., live/work loft, Marquez Place Lofts, Santa Fe, private outdoor patio, handicap accessible, $349,000. Mattox, 505-856-6810, donmattox@mpinm.com.

3-BDR. HOME, 2 baths, 1,200-sq. ft., large yard, view of Sandia mountains, $125,000. Ramos, 505-220-5201.

HACIENDA COMPOUND, w/walled courtyard, under cottonwood trees, 2.75 acre farm w/buildings, foot of Tome Hill, $277,000. Martell, 505-289-4247.

3-BDR. HOME, 1-3/4 baths, metal roof, cul-de-sac, long single-car garage, Northeast Heights, $135,000. Flores, 681-7081.

3-BDR. HOME, 1-3/4 baths, 1,630-sq. ft., updated floors, kitchen, bathrooms, newer roof, Juan Tabo/Constitution, MLS#860780, $190,000. Kwok, 925-639-6398.

5-BDR. HOME, 2 baths, 2,000-sq. ft., 2-story, newly remodeled bath & basement bdr., 1-car detached garage, historic register Spruce Park, call for showing before listing, $375,000. Jennings, 505-610-1142.

TRIPLEX, 500-sq. ft. units, good rental investment, close to base, VA hospital, MLS848840, $122,000. Caruso, 505-459-8286.

WANTED

OUTBOARD BOAT MOTOR, working, 60-70-hp. Nimmo, 803-8586.

FEMALE SINGER, 21+-yrs. old, alternative rock recording project, friends/family of Sandians encourage. Romero, 504-6645.

USED KITCHEN CABINETS, will help remove & pick-up or purchase. Wilder, 505-331-6969.

OLD-FASHIONED MICROWAVE, w/knob for time set instead of touch screen, for elderly person. Chavez, 505-864-4893.

ROOMMATE, fully furnished room, private bath, Volterra, 5-mins. to base, perfect for summer intern. Do, 505-814-8164.

ROOM TO RENT, college engineering intern, needs place for summer/fall (May-Dec.), or a fellow Christian roommate. Jackson, 505-281-8927.

ROOMMATE, 2-bdr. apt., 1 bath, $400/mo., utilities included, call or text. Black, 505-363-3025, ask for Keith.

Sandians support Rare Disease Day 2016

Sandians joined Dept. 3600 Director Becky Krauss (front, second from left) and Diana de la Rosa Galey (back, left) in a show of support for Rare Disease Day 2016. Becky is the executive champion of Sandia's Disabilities Awareness Committee, which is co-chaired by Diana (4236-4) and Tammy Sanchez-Godin (3011). Diana, who has a daughter with a rare disease, says this is the first year Sandia — or any organization in New Mexico — participated and hopes that support will continue to grow each year. Rare Disease Day takes place on the last day of February each year. The main objective of Rare Disease Day, according to its website, is to raise public awareness about rare diseases and their impact on patients' lives. Since Rare Disease Day was launched by The European Organisation for Rare Diseases (EURORDIS) and its Council of National Alliances in 2008 thousands of events have taken place around the world. The campaign, which started as a European event, has now spanned the globe with more than 80 countries taking part. Photo by Randy Montoya)

The turning wheel of fortune lifts the avatar of solar

By Neal Singer

Chapter 4: Staying cool as stress deepens

In a cheerful red-plaid sweater and looking relaxed, Murat Okandan, CEO of mPower (empower), the solar start-up of which he is chief executive and sole employee, waved me over to his table at Flying Star, where he was enjoying tea and cookies.

I expected some sign of stress. When he took entrepreneurial leave from Sandia nine months earlier, the company with its initial group of entrepreneurial Sandians was flush with talent. Now, after some differences of opinion and tightening of belts, only Murat was left to tell the story. I also knew some important funding had ceased from an international energy company formerly helping to float the organization.

"Why aren't you looking more haggard?" I said. "Tearing your hair?"

"Would it help?" he said, smiling.

"Are you living more frugally?"

"Not unreasonably frugally, but more frugally."

"Are you so calm because you're not all in? Because you can always pull the ripcord and float back to your job at Sandia?"

"It's not like I'm out of a job and don't know where to go," he conceded. "But the bigger risk is that we have something valuable and can't deliver it."

His wife is supportive, he said.

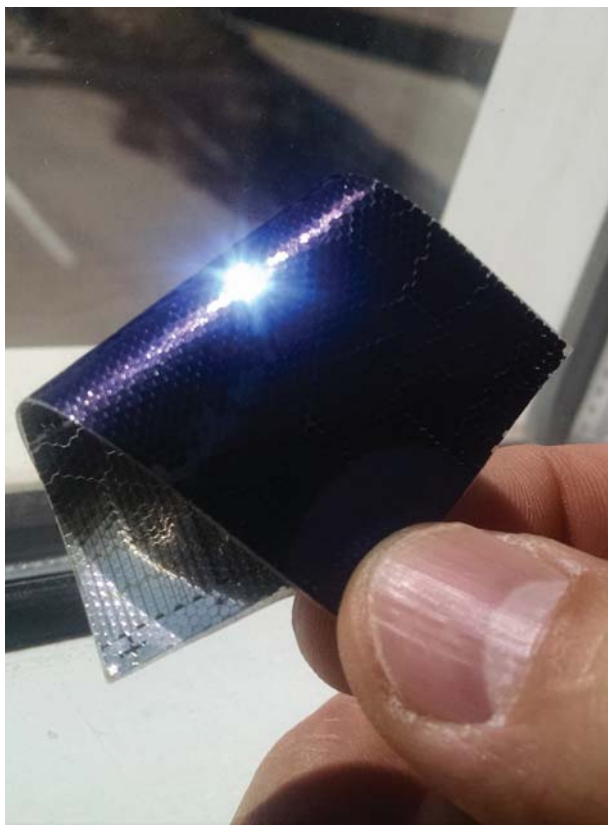
"But money is not the key factor," he said. "My target date depends on whether certain things that need to be accomplished by a certain period are done. There are things this solar technology can do, and there's only a limited time to bring it to a certain level of maturity. Either it'll be dropped or someone else will take it. Then it's time to make other decisions."

Would that be returning to Sandia?

"There might be other opportunities as a result of the business and scientific interactions I've had through mPower." He took a sip of tea. "But I'm still here."

The company's immediate goal is to commercialize very small, very thin photovoltaic particles, previously described as solar glitter – now Dragon SCALEs™, created in wafers, and interconnected into a hyper-dense network. The particles are so thin, light, and strong that Murat believes they are a natural for space flight, stored at take-off as a tiny, robust, ultralight package that can be opened in space to create an ultralarge solar array. The array would provide the right kind of power to enable electric propulsion and ion drives that allow satellites to change and maintain orbits. They would also be inexpensive and efficient to install on rooftops and in large solar-power farms when configured for terrestrial solar power, at a cost level below what current technology can offer, Murat says.

RIDING THE ROLLERCOASTER — Sandia entrepreneur Murat Okandan is surviving the perils of starting a photovoltaic company. After a period of financial drought, he now has funding and a business-savvy chief operating officer.



PHOTOVOLTAICS: THE NEXT GENERATION? — The "dragon scales" of mPower require far less silicon than conventional photovoltaics, and rest on a bendable substrate. Their lightness and flexibility could make them the industrial choice to provide power to satellites in space.

> *"It will be challenging to build a business around an early stage technology, but that is the life of a tech startup"*
>
> — Pete Atherton, mPower chief operating officer

Potential customers have told him "they want this product variant or that," he said. "It could happen faster if projects were more lined up with customers and the business side of things more mature, but everything takes longer than you expect." A 300-kilowatt solar array for space applications is an attractive target, he says, and his technology could bump up to one megawatt or more per payload, with the right projects, partnerships, and resources in place.

Then he looks at me with a certain intensity. "There's going to be a very rapid transition, from electricity distributed by large power plants to electricity individually produced, stored, and traded," he said. "Individual production will be more efficient, with lower cost, higher reliability, and better able to predict how much is being produced. I want to help make that happen."

He had told me that months ago, but his desire to advance humanity got buried in my mind under more mundane items: the nuts and bolts of financing, product, customers. But now, seeing the idea sally forth again from Murat, it's clear that entrepreneurs need belief to hurdle any broken bridges in the so-called valley of death, which slays most new ideas coming to market when the oxygen of money gets too thin for the entrepreneurial swimmer to reach the far shore of production. An entrepreneur may need belief that overrides the hesitations of "realists."

At the bottom of his calm, the fire that drives Murat is a deep-felt passion that solar power represents humanity's best future, and he intends to be one of the leaders of that effort.

Chapter 5: But wait — the wheel turns!

One week later, Murat has gotten some very good news, showing that fortune favors the stubborn:

First, he's engaged two backers whose financial support will enable him to proceed with fabrication efforts "to deliver prototypes to our first customers, and to continue conversations with other potential investors." His now-doable game plan is, in six months, to have commercially relevant prototypes to present that are ½ x 1 meter instead of early prototypes of ½ inch x 1 inch. The prototypes will be lightweight, very powerful in a small area, demonstrate less degradation, a low failure rate, and enable real-time state-of-health monitoring.

"We're going to change the way photovoltaics are put together and operated, which are key issues for industrial customers," he says. "This is an initial portion to get things rolling." He has proposals out to DOE, NASA, and ARPA-E for projects that will support development of products and commercialization of the technology.

Second, former Sandia executive Pete Atherton, who just retired from Sandia, has come on board at mPower as chief operating officer. Pete's experience in building new businesses include two successful tech startups, he says.

"It will be challenging to build a business around an early-stage technology, but that is the life of a tech startup," Pete says. "The last venture-backed startup I was with as COO was a renewable tech company that successfully sold to a utility and gave nice returns to the investors. I hope to bring that experience to mPower to help Murat utilize the Sandia breakthrough technology to grow a very successful business."

So, it's on. We'll be back to report on future bumps and elevations in the mPower road. Godspeed, Murat, Pete, and their unnamed investors: Travel at solar warp speed.